

Ernst Moerk and the Puzzle of Zero-Trial Learning

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At the 2004 convention of the California Association for Behavior Analysis (CalABA), I participated in a panel discussion with Janet Twyman, Greg Stikeleather, and Hank Schlinger on the interpretation of complex human behavior. At the outset of my remarks, I made a great show of setting my watch so that I should stay within my allotted time. I explained, “I bought this watch for ten dollars at WalMart. I like that it has all twelve numbers on the dial, in big black numerals. I realize that it’s a piece of junk, but as my friend, Uchena Mbanefo, says, ‘*De gustibus non est disputandum*’ ... there’s no accounting for taste.”

Since the audience was getting restive, I then began my talk about one-trial learning. In the *Behavior of Organisms*, Skinner (1938) reported that a feeder-trained rat, well adapted to the experimental apparatus, commonly shows an immediate change in the strength of lever pressing following a single reinforcement. His evidence for one-trial learning contrasted with the notion that there is a “learning curve” along which behavior changes on successive trials. Skinner concluded that reinforcement causes an instantaneous change in the strength of behavior; learning curves are the result of poorly controlled conditions, of experimental preparations in which concurrent contingencies contaminate the effect of the target contingency. For example, Thorndike’s cats, when placed in puzzle boxes, engaged in a lot of irrelevant escape behavior that degraded the regularity of changes in strength of stepping on the treadle that opened the door. Under the special conditions of tight experimental control, we should expect to see one-trial learning.

The discrepancy between behavior under tightly controlled and loosely controlled conditions occasions no surprise. Toss a ball into the air, roll it down an inclined plane, drop it

from a tower, bounce it, spin it: the predictions of our physics books will be slightly in error, for we have not controlled air resistance, temperature, friction, the elasticity of materials, and so on. We might expect, then, that one-trial learning emerges under only idealized conditions, that it is rare in nature.

But one-trial learning is commonplace in human behavior, so commonplace that we would be astonished if it did not occur. How many trials would it take you to learn that the red box is full of scorpions and the blue box is full of diamonds? Or that the switch with the red indicator light turns on the computer? Or that you got a B on the exam, not the A+ you were hoping for? Or that the weatherman predicts a blizzard tonight? An enterprising student recently gave me a small pine box containing gourmet chocolates; I had no trouble repeatedly operating the hinged lid after my first trial. We are continually learning new routines, new computer commands, new names, the route to new bathrooms, how to operate new-fangled hotel keys, and so on, and it is not uncommon for such learning to occur on a single trial under conditions that are by no means tightly controlled.

What are we to make of such examples? Are we “smarter” than rats? Another explanation is possible: Several incompatible behaviors may each be strong, but only one can be emitted at a given time. To the observer, only one response appears to be strong, for only one is emitted. However, a slight shift in controlling relations may cause another to emerge in strength. When a dominant response is put on extinction; it declines in strength just until it becomes weaker than competing responses. It loses no more strength because it is no longer emitted. It remains “just below threshold,” so to speak, in the sense that it can easily be nudged into dominance again. In familiar contexts, human behavior is commonly a cauldron of competing responses. I have argued the point in greater detail elsewhere (Palmer, 1997):

One-trial learning is commonplace in human behavior only when the target behav-

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ior is already a strong response in the subject's repertoire but happens to be weaker than other behavior in the prevailing circumstances. The behavior to be conditioned when an adult human learns that the weatherman predicts rain, or that a wall switch turns on the overhead fan, or that the soup-of-the-day is clam chowder are all responses that have been thoroughly conditioned under similar circumstances. When we listen to a weather report, we are already inclined to assert that it will rain, or, as it may be, that it will be fair. The same variables that make us tune in to the weather report in the first place increase the likelihood that we will make statements about the weather. The weather report itself merely selects some subset of those statements. When we discover a switch, we are already confident that it will turn something on. In a restaurant, "clam chowder" is one of some dozens of responses that are already weakly evoked by the setting long before the waiter recites the daily specials. The effect of the contingency of reinforcement is to slightly modify the control of the target response by the current setting so that it becomes stronger than the myriad other responses that tend to be evoked in that setting. At any moment, the potential behavior of an experienced organism can be thought of as a panorama. Reinforcement of a well-practiced response is analogous to increasing the illumination on a figure in the panorama to make it stand out from the background.

In contrast, some responses have little or no baseline strength. They have to be drawn into the panorama from scratch, as it were. When we hear someone speak in an unfamiliar tongue we usually find ourselves unable to repeat what was said. Even repeating a single word might be difficult. We may have to try many times before we get it even approximately right, particularly if it is composed of unfamiliar phonemes. When we first learn to ride a bicycle, to operate a clutch, to swim, to juggle oranges, to "walk the dog" with a yo-yo, the relevant behavior is shaped for the first time, and it commonly takes many trials before successful behavior consistently emerges. The target behavior has no baseline strength; our behavior is highly erratic at first and smoothes out over repeated trials. (pp. 276–277)

Thus one-trial learning is commonplace in human behavior because we often find ourselves in familiar circumstances where relevant behavior, even if not prepotent, is already strong. A single reinforcement can alter the delicate balance of competing responses.

But formidable puzzles remain: To illustrate the point, I interrupted my CalABA talk with a pop quiz: "How much did I pay for my watch?"

There was a chorus of responses from the audience, "Ten dollars." Even the silent ones, when pressed, acknowledged that they knew the answer, although two people admitted ignorance because they hadn't been "paying attention." However commonplace this performance may be, it is puzzling and requires an interpretation. It is not just another example of one-trial learning, for there was no trial—at least no trial in the usual sense. I simply emitted some verbal behavior. ("I paid ten dollars for this watch at WalMart . . .") There was no apparent behavior on the part of the audience and no apparent reinforcement. There was no contingency. In what sense can this be called a trial? But learning had occurred, as the results of the quiz showed. Confining oneself to a consideration of observable variables, one might conclude that mere exposure to a pattern of verbal stimuli is sufficient to effect a change in relevant behavior in verbally sophisticated subjects to a different set of verbal stimuli (i.e., "How much did I pay?"). Is this not zero-trial learning?

I continued with the quiz. "Where did I buy the watch?"

"WalMart."

"Why do I like it?"

"It has big black numerals."

"What did my friend say about my purchase?"

"There's no accounting for taste."

"No, no. What did he say, literally?"

There was a long pause. Nobody seemed to know. Then Ernst Moerk, in his delightful German accent, piped up, "*De gustibus non est disputandum!*" Then, in an aside, "I was a Latin scholar." Thank goodness for Ernst. If my demonstration were not to fall flat, the Latin phrase had to be unfamiliar to most of the audience but not all. It was a near miss.

"What was my friend's name?"

Nobody knew, not even the erudite Ernst Moerk, for Latin scholar and polyglot though

he was, he had no repertoire with respect to Nigerian names.¹

INTERPRETATION

The demonstration suggests the following generalization: Under some conditions, when we hear someone speak, our behavior changes, even in the absence of an apparent contingency of reinforcement, but only if we have in our repertoire verbal operants whose stimulus products are the same as those of the speaker. Nearly everyone knew what I had paid for my watch, where, and why I bought it. All of the relevant operants ("ten dollars," "WalMart," "black numerals") were undoubtedly already in their repertoires in some strength. However, when the verbal operant was a foreign phrase, only Ernst, the Latin scholar, could recall it. For him, a Latin phrase was no different from "ten dollars." For everyone else, however, the response had no baseline strength, and exposure to it had no apparent effect. The Nigerian name had no effect on anyone, for in no one did the operant have any baseline strength.

But it is obvious that this generalization is inadequate. It makes no reference to any established behavioral principle. If mere exposure to stimuli were sufficient to induce the kinds of complex behavioral changes observed in the audience in this example, what would we make of a century of experimental analysis that suggests otherwise?

The clue apparently lies with the two individuals who were unable to answer any of my questions, even routine ones, for they were not "paying attention." We observe behavioral change only if our listeners are attending to what we say, and even then, only if the corresponding verbal operants are in the listener's repertoire. What, in behavioral terms, does it mean to "pay attention," in this context? Surely, at a minimum, it means to behave discriminatively with respect to the relevant verbal stimuli. If we assume further that "attending to the speech of another" means covertly echoing it, all of the variability in the behavior of

my audience can be tentatively explained. Only those with the relevant verbal repertoire can echo Latin phrases or Nigerian names. Moreover, even if one has the requisite repertoire, echoic behavior may not be prepotent if one is reading one's program book while a speaker is muttering anecdotes about his watch; competing behavior is stronger. Thus the listener is not an inert vessel. Behavior is reintroduced into our account in the form of echoic behavior. Moreover, it is precisely the kind of behavior that is required later: Covert echoic behavior is, in effect, rehearsal for the pop quiz.

What of reinforcement? Is there any reinforcement for covertly echoing the speech of another, thereby providing the final ingredient of a three-term contingency? In face-to-face dialogue one can usually tell if one's listener is following the thread of one's speech, and there are no doubt subtle conventions of conversation—eye contact, pitch of voice, speed, volume, latency, and so on—that serve equally subtle reinforcing functions. But in a public lecture there can be no such meticulous feedback. However, there are undoubtedly intrinsic conditioned reinforcers for the listener. Effective listening is so commonly a necessary precursor of effective action that any invariant stimuli correlated with effective listening should acquire a conditioned reinforcing function. This conditioned reinforcing function would of course be sensitive to context. In the presence of one's garrulous aunt the value of effective listening would be discounted; when taking directions from one's boss it would be inflated.

It appears, then, that the present anecdotes offer no support for "zero-trial learning." Human behavior is exquisitely sensitive and complexly determined, but a consideration of contingencies of reinforcement is still our most powerful interpretive tool and putatively a sufficient one.

I am persuaded that such interpretive exercises are appropriate, for they help us to make sense of human behavior in domains in poorly controlled settings by appealing only to principles that have been extracted in experimental analyses of behavior under favorable conditions. Nor are they devoid of practical implications. If my interpretation of the behavior of my listeners is correct, or nearly so, some of our applied procedures may be too heavy-handed. If stimuli arising from effective listen-

¹To console those of my friends who are blushing for me, who are mortified by my plebeian shopping habits, I must confess that the opening anecdote was entirely contrived for the purpose of my talk. I did not, in fact, pay \$10 for my watch. I paid \$8.96.

ing are commonly conditioned reinforcers, there may be tasks for which the use of extrinsic and artificial reinforcers is unnecessary and perhaps even contraindicated. Presumably, natural reinforcers are best. Since the natural contingencies might be beyond our ability to measure in many applications, we should keep our interpretive tools sharpened.

A PERSONAL POSTSCRIPT

In my CalABA remarks, I alluded to the “Ernst Moerk effect,” for his performance perfectly illustrated the role of one’s repertoire on the effect of a verbal stimulus. Following the talk he approached me to chat, and he expressed surprise and delight that I had known his name. What extraordinary modesty! I had been attending his talks at every opportunity for many years. Often he and Ullin Place would share the podium, and it was an unparalleled treat to hear the scholarly German and the urbane Englishman exquisitely repudiate the dogma of

conventional linguistics. Ernst was a great man, and like almost every reader of this journal, I knew him and revered him. But his surprise at being recognized was genuine. He was humble and sweet, and therefore all the greater man. His legacy as a scholar will surely endure, but he left another, less tangible, legacy of personal comportment. If a casual verbal stimulus alters the verbal repertoire of the passing listener, one’s bearing surely affects that of the passing observer in an analogous way. Ernst Moerk’s modest dignity has subtly changed all of us who knew him and changed us for the better.

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